

## Collaborative participation in aphasic conversation before and after intensive language-action therapy

### **Abstract**

This study applies conversation analysis to compare everyday conversation samples between a person with aphasia (PWA) and a familiar communication partner (CP) before and after intensive language-action therapy (ILAT). Our analysis concentrated on collaborative repair sequences with the assumption that impairment-focused therapy would translate into a change in the nature of trouble sources, which engender collaborative repair action typical of aphasic conversation. The most frequent repair initiation technique used by the CP was candidate understandings. The function of candidate understandings changed from addressing specific trouble sources pre-ILAT to concluding longer stretches of the PWA's talk post-ILAT. Alongside with these findings we documented a clinically significant increase in the Western Aphasia Battery's aphasia quotient post-ILAT. Our results suggest that instead of mere frequency count of conversational behaviours, examining the type and function of repair actions might provide insight into therapy-related changes in conversation following impairment-focused therapy.

### **Introduction**

For decades, aphasia therapy following stroke has been approached from two main perspectives (e.g. Basso, 2010; Herbert, Best, Hickin, Howard & Osborne, 2003). On the one hand, the impairment-focused approach aims to rehabilitate the linguistic problems of people with aphasia (PWA) through the use of exercises, which target the specific deficits identified by psycholinguistic measures. On the other hand, the functional or consequence-focused

approach is based on the recognition that PWAs usually communicate better than they speak (cf. Holland, 1991). Therefore, the target of aphasia therapy becomes enhancement of the functionality of PWAs' everyday communication by teaching and guiding communication partners (CPs) to communicate optimally, for example, thus enabling PWAs to participate maximally in conversations (e.g. Simmons-Mackie, Raymer, Armstrong, Holland & Cherney, 2010). Regardless of therapy orientation, however, aphasiologists and clinicians agree that the ultimate outcome of aphasia therapy should be an improvement in the PWA's everyday communication. As conversation is the most common use of language in our everyday lives (e.g. Schegloff, Jefferson & Sacks, 1977), and as it is the action in which the aphasic problems surface, restricting PWAs' communicative activity and participation, conversation has lately been recognized as an important outcome measure in aphasia therapy for both impairment-focused and consequence-focused approaches (for reviews see Carragher, Conroy, Sage & Wilkinson, 2012; Simmons-Mackie, Savage & Worrall, 2014).

Regarding impairment-focused therapy and conversation outcomes, Carragher et al. (2012: 899) stated in their review article that 'the field of aphasia intervention is in its infancy in demonstrating that aphasia therapy can create change in everyday conversations of PWA'. So far, according to the authors, there is emerging evidence that impairment-focused therapy can have a positive impact on conversations of PWA. However, the majority of impairment-focused outcome studies, and intensive language-action therapy (ILAT) (Diffrancesco, Pulvermüller & Mohr, 2012) studies in particular, have so far not analysed conversation as an interactive phenomenon (see also Boyle, 2011). Thus, Carragher et al. (2012: 911) suggest that future studies could make use of 'broader measures to analyse how these changes fit into the larger landscape of conversation in terms of repair, turn-taking or topic initiation'. Perkins, Crisp and Walshaw (1999: 279) have found the qualitative method

of conversation analysis (CA) (e.g. Sidnell & Stivers, 2013) useful in investigating outcomes of aphasia therapy, and stated that the effect of impairment-focused treatment ‘should be detectable in a change in the nature of trouble sources arising from the impairment being treated in therapy’. CA has not, however, previously been used in studying outcomes following impairment-focused aphasia therapy.

Consequently, we report on a study that uses a conversation analytic approach to compare everyday conversation samples of a dyad with a PWA and her CP before and after ILAT, which we regard as a variant of impairment-focused aphasia therapy. The aim of this study is to investigate possible treatment-related change in repair action typical of aphasic conversation (cf. Ferguson, 1994). We concentrated our analysis on collaborative repair sequences (i.e. self-initiated other-repair and other-initiated self-repair). We hypothesized that ILAT would improve the PWA’s linguistic abilities and communicative effectiveness, which might translate into a change in the nature of trouble sources, giving rise to collaborative repair (cf. Perkins et al., 1999). For instance, the PWA’s improved word-finding abilities in conversation could be reflected as a diminished need for the CP to reformulate or complete the PWA’s turns. Also, the PWA’s improved word finding might increase the ability to self-repair trouble in conversation, thus removing the need for collaborative repair action typical of aphasic conversation (i.e. the amount of collaborative repair would decrease).

## Background

Impairment-focused studies rooted in cognitive neuropsychology have utilized conversation as an outcome measure mainly at a micro-linguistic level. Variable measuring instruments

and conversation tasks have been used. Some studies have used conversation samples structured by questions (e.g. Rose, Douglas & Matyas, 2002), whereas other studies do not elaborate on conversational tasks used (e.g. Boo & Rose, 2011). Some studies have used conversation samples involving the PWA and the researcher (Herbert, Gregory & Best, 2014; Kristensson, Behrns & Saldert, 2015; Rose et al., 2002), which brings about the problem that findings from researcher/clinician - PWA conversations cannot be extrapolated to natural conversations with significant others, because it is known that clinicians and significant others interact differently with PWA (e.g. Laakso, 2015; Lindsay & Wilkinson, 1999). However, there are an increasing number of impairment-focused studies that have explored natural conversation with a familiar CP as an outcome measure (Best, Grassly, Greenwood, Herbert, Hickin & Howard, 2011; Carragher et al., 2015; Carragher, Sage & Conroy, 2013; Herbert, Hickin, Howard, Osborne & Best, 2008). These studies have nevertheless failed to demonstrate treatment effects in conversation at group level. Still, individual analyses have revealed that some PWAs improved, as indicated by the use of more nouns per substantive turn in conversation, for example (Best et al., 2011). Although these studies have collected everyday conversation data, the focus has mainly been on the PWA's linguistic performance, not on dyadic interaction.

In recent years, neuroscience insights have resulted in the development of new aphasia therapy methods (cf. Berthier & Pulvermüller, 2011; Pulvermüller & Berthier, 2008). Neurorehabilitation of language can be regarded as a variant of impairment-focused approaches, as it aims to remediate brain-based aphasic problems by promoting and guiding neuroplastic reorganization with exercises and other neuro-modulating methods such as transcranial magnetic stimulation and medication. At present, ILAT (Difrancesco, Pulvermüller & Mohr, 2012), also known as constraint-induced aphasia therapy (CIAT) or

constraint-induced language therapy (CILT) (Pulvermüller & al., 2001), is an established speech and language therapy method. Key elements of ILAT are encouragement of verbal communication to address learned non-use, intensive practice, and a communicatively relevant treatment setting (Difrancesco et al., 2012; Meinzer, Rodriguez and Gonzales Rothi, 2012). ILAT does not engage significant others, nor does it explicitly address communicative strategies. Thus, we regard ILAT more as an impairment-focused therapy than a consequence-focused method. The principle of communicative relevance in particular does, however, differentiate ILAT from traditional impairment-focused methods: in ILAT the focus is on interactive language, usually targeted at a group setting (Difrancesco et al., 2012), whereas impairment-focused therapy is typically implemented in an institutional setting dominated by a speech and language therapist (SLT) with the intention to produce certain linguistic structures. Research has documented the beneficial effects of ILAT in chronic aphasia when outcome has been measured by standardized language tests, different discourse measures as well as self- and other-ratings of functional communication (Meinzer et al., 2012). However, studies reporting the outcome of ILAT at the level of everyday conversation are lacking.

Consequence-focused treatments have obviously taken the CP into account, as the rationale for partner or dyad training lies in the collaborative nature of conversation. Defined as ‘conversation therapy’ by Simmons-Mackie et al. (2014), the aim of these approaches is to straightforwardly focus on changing the behaviours of the conversationalists within the context of conversation. The theoretical underpinnings of consequence-focused approaches can be described as drawing from the social or participation model, functional orientation or CA (Simmons-Mackie et al., 2014). In the following we will concentrate on CA-informed aphasiology work.

A focus of much CA-informed aphasiology work has been on repair practices (Wilkinson, 2015), which is unsurprising as it is obvious that the various linguistic problems connected with aphasia interfere with the ability to converse fluently, resulting in frequent problems in interaction. CA regards repair as one fundamental structure of any conversation (cf. Sidnell & Stivers, 2013). Repair was defined by Schegloff et al. (1977: 361) in their seminal paper as operating in conversation ‘addressed to recurrent problems in speaking, hearing, and understanding’. CA distinguishes between self-initiated and other-initiated repair (see Kitzinger, 2013 for an introduction to repair). In ordinary conversation, it is in most cases the speaker of the trouble source turn who initiates and produces the solution to a repair (i.e. self-initiated self-repair). Other-initiated repair, according to Schegloff (2000), usually entails the recipient of a trouble source turn initiating repair in the next turn, and generally leaving the speaker of the trouble source turn to resolve it in the subsequent turn (i.e. other-initiated self-repair, OISR). Other-initiated repair can be accomplished with different types of turn constructions, and Schegloff et al. (1977: 369) laid out a continuum of formats depending on the ‘power’ of the initiator to ‘locate a repairable’ (i.e. the trouble source). Open repair initiators such as ‘Huh?’ are considered weak as they display virtually no understanding of the prior talk, whereas the strongest initiator is a candidate understanding (i.e. a paraphrase or formulation of the trouble source turn) as it provides the speaker of the trouble source turn with a practically adequate comprehension for confirmation or rejection (Kitzinger, 2013).

Research on aphasic conversation has revealed that like non-aphasic persons, persons with fluent aphasia also initiate self-repair (e.g. Laakso, 1997). However, PWA often need the help of their CP to resolve the trouble: a collaboration has to be established (e.g. Klippi, 1996). Word-finding problems, which are typical to all aphasia types, can sometimes result in

long collaborative ‘hint and guess’ sequences (Laakso & Klippi, 1999). In addition, the use of multimodal resources such as gesturing and pointing during word search, for example, is typical of aphasic conversation (Klippi & Ahopalo, 2006; Klippi, 2015). Regarding repair initiation, Ferguson (1994) studied non-aphasic speakers conversing with PWAs and found that they increased their trouble-indicating behaviours (e.g. hypothesis forming of a prior turn) and used collaborative repair patterns (e.g. OISR or self-initiated other-repair, i.e. SIOR) more frequently compared to conversations with non-aphasic partners. Ferguson interpreted this as both a qualitative and quantitative adjustment to aphasia. Perkins et al. (1999) have demonstrated that collaborative repair action of a dyad with a PWA shows consistent patterns across conversations at different time points in regards to both the predominant trouble source (in PWA’s turns) and the sequence of repair resolution.

Based on Clark and Schaefer’s model of communication, Milroy and Perkins (1992: 31) discussed the notion of ‘least collaborative effort’, which refers to the idea that conversationalists ‘strive to minimize the total effort spent on a contribution in both presentation and acceptance phases’. In aphasic conversation this is displayed in the PWA’s need to rely on collaborative repair work and in the CP’s contribution to solve the problem. Milroy and Perkins (1992) identify paraphrasing (i.e. a candidate understanding) as a particularly useful repair strategy in aphasic conversation. Compared to a weaker repair-initiator, for example an open repair, a candidate understanding reflects the recipient’s understanding of the trouble source turn and offers an interpretation of this to be confirmed or rejected, thus allowing for a quicker resolution (Perkins et al., 1999). Also, a candidate understanding avoids putting the aphasic problem under the spotlight by having the PWA attempt to repeat or reconstruct the trouble source turn, for example.

Recognizing the uniqueness of every conversation as co-operative work of the

conversationalists that unfolds over time, CA has traditionally been wary of detaching conversational phenomena from their interactional sequence for the purpose of quantification (Wilkinson, 1999). The risk is that phenomena which appear similar on the surface may be grouped together, even though their interactional functions are different (Schegloff, 1993; Wilkinson, 1999). Schegloff (1993) also highlights the absurdity of counting interactional productions per minute, because people do not interact per a time frame. Rather, it is the interactive sequence that matters. Accordingly, if basic descriptive statistics are to be used, the denominator should be ‘environments of relevant possible occurrence’ (Schegloff, 1993: 107).

## **Method**

Our data was collected as part of the study Treatment-induced speech and language improvement and neuroplasticity after stroke at the University of Helsinki. The study is a randomized clinical controlled study (Figure 1), which recruited 17 PWAs with the aim of comparing separate and combined effects of ILAT and transcranial magnetic brain stimulation (TMS) on chronic aphasia. The study procedure included collecting everyday conversation samples from PWAs and their significant others, which resulted in approximately 24 hours of video-recorded conversations before, during and after intervention. The study is conducted in accordance with the Declaration of Helsinki, and the protocol and its amendments have been approved by the Local Ethics Committee for clinical trials of the Hospital District of Helsinki and Uusimaa (HUCH). The research permits are administered by HUCH and Helsinki city hospital.

*Insert Figure 1 about here.*



## Dyad

The dyad reported in this paper is Riitta (all names reported are pseudonyms), a 63-year-old woman with mild aphasia, and her daughter Tiina, with whom Riitta talks on a daily basis. Riitta sustained a left hemisphere ischaemic stroke 4 years and 3 months prior to the study. She is right-handed and has no hemiparesis. She has no additional neurological diagnosis, and no hearing defects or severe depression. According to the Finnish version of the Western Aphasia Battery (WAB) (Pietilä, Lehtihalmes, Klippi & Lempinen, 2005) (Table 1), she has anomic aphasia with mild apraxia of speech. Both WAB and the Token Test (De Renzi and Faglioni, 1978) indicate that she has some problems comprehending longer instructions. Prior to her stroke Riitta worked as an accountant. At the time of the study she was retired and lived alone. Riitta had no ongoing speech-language therapy during the period of the study. As we did not target intervention on the conversation dyad per se, we did not gather any detailed information about the CP.

Riitta and her significant other were chosen for this paper on the following grounds:

1) there was no missing video data, 2) the same CP was present in all video recordings, 3) they were randomized into the sham TMS group so that the post-TMS recording could be considered as a second baseline, and 4) the video recordings consisted of conversation. In addition to this dyad, there were three others fulfilling the same criteria; this dyad was chosen for this study since it had the longest duration of video material.

## Rehabilitation

### Intensive language-action therapy (ILAT)

ILAT was carried out as a barrier game, as described by Difrancesco et al. (2012). We used a

picture vocabulary of 555 nouns and 421 verbs. Therapy was implemented in a group of three PWAs and an SLT, who was a co-player modelling possible requests. An SLT student assisted the PWAs when necessary. Therapy sessions lasted for three hours, with a short break in between, five days a week, for two consecutive weeks (Figure 1), totalling 30 hours of therapy.

### Sham TMS with concurrent confrontation naming

Riitta was randomized into the sham TMS group (group B in Figure 1), which meant that she did not receive actual transcranial magnetic stimulation. During sham TMS, Riitta was presented with noun and action pictures to name. No cues were provided, and no feedback on naming performance was given. As Riitta did not receive actual TMS, and as previous studies (e.g. Herbert et al., 2003) have shown that mere confrontation naming without a discourse context barely translates into conversational gains, we do not regard this condition to be of any further importance to this paper.

### Language testing

The following language tests were administered at the four different testing points (Figure 1): Western Aphasia Battery (WAB), aphasia quotient (AQ) (Pietilä et al., 2005), Boston naming test (BNT) (Laine, Koivuselkä-Sallinen, Hänninen & Niemi, 1997), Action naming test (ANT) (Laine & Neitola, 2005), and the Finnish version of the Token test (De Renzi & Faglioni, 1978).

### Conversation data

We instructed our dyad to video record ordinary everyday conversation for about 15-20 minutes at each testing point in a situation where they would normally talk about everyday matters. No specific instructions regarding the content of conversations were given.

Instructions on camera use were given at a home visit; the camera was left for self-directed recordings and was collected a few days later.

Our dyad video recorded a total of 1 hour and 21 minutes of conversation at the four different time points (Table 2). Riitta and Tiina were seated at a table but due to the camera angle only Riitta can be seen in the videos.

### Analysis of conversation data

Conversations were transcribed in full by the first author according to the conventions of CA (e.g. ten Have, 2007). To compare conversation samples of different lengths, the number of turns was first counted, from which the proportions of repair action could later be calculated. Linguistic impairments caused by aphasia are likely to be manifested in turns with content words (Herbert et al., 2014). Therefore, following Perkins et al.'s (1999) and Herbert et al.'s (2012) work, we differentiated between major and minimal turns. A major turn contains at least one content word (i.e. a noun, proper noun, verb, adjective, adverb or numeral) or is a yes/no answer to a question, whereas a minimal turn does not add new linguistic information to the conversation (e.g. tokens such as uhuh, mm, yeah). We regarded a major turn as 'the environment of relevant possible occurrence' (cf. Schegloff, 1993: 107) of collaborative repair action typical to aphasic conversation (Perkins et al., 1999).

### Identification of repair sequences

To minimize the effects of experimenter expectancy, we used an independent rater. An SLT, with expertise in CA and repair actions in particular, who was unaware of the study design and blinded to the sample point of the data, was provided with the videos and transcripts and asked to identify collaborative repair sequences (i.e. SIOR and OISR). This totalled 35 repair sequences. The structure of the sequences was further analysed and discussed in a data session in order to reach consensus. The types of repair initiation techniques (see Table 2) were identified based on examples presented by Goodwin and Goodwin (1986), Koshik (2005), Lerner (1999), and Schegloff et al. (1977).

## **Results**

### Linguistic outcome measures

The results of the language tests are presented in Table 1. Visual inspection indicates no significant change in the confrontation naming tests (BNT and ANT) and the Token Test, which measures receptive language. Riitta's performance on the BNT and ANT is near maximum, which indicates a ceiling effect. Thus, these measures are not specified enough to capture change in her case. In contrast, the WAB AQ shows an increase of six and five points after ILAT and at follow-up respectively, compared to a mean score of 87.6 for tests 1 and 2. A change of five points or more has been regarded as clinically significant using the original version of WAB (Katz & Wertz, 1997).

*Insert Table 1 about here.*

### Conversation data

Figure 2 shows the distribution of turns in the four conversations. Visual inspection shows that in terms of all turns (%), Riitta and Tiina contribute relatively equally in all four conversations. Riitta uses fewer major turns and more minimal turns compared to Tiina, but the distribution of major and minimal turns per speaker remained similar in all four conversations. Hence, according to these structural conversational measures the four conversations are comparable.<sup>1</sup>

*Insert Figure 2 about here.*

### Repair sequences

Table 2 presents the type and number (n) of OISR and SIOR actions across the four conversations as well as the portion (%) of major turns, which gave rise to repair action by the other party (e.g. in the baseline conversation Tiina initiated or resolved repair on 16.5% of Riitta's major turns). As a whole, the results demonstrate that it is Tiina, the CP, who makes the majority of repair initiations (n=32), and in this regard the conversation is asymmetric. In the whole data, Riitta makes only three repair initiations on Tiina's turns (i.e. two partial repetitions of a trouble source turn and one *What is X-type* question), and Tiina repairs all of these in the next turn. As Table 2 presents, the frequency of CP-initiated repairs demonstrates a decreasing trend with a pre-ILAT mean of 10.2% to a post-ILAT mean of 6%.

*Insert Table 2 about here.*

The most frequently used repair initiation technique in the data is candidate understanding (n=18), which was used by Tiina only. The second most frequent repair action is connected to instances where Riitta indicates trouble with word search and Tiina

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<sup>1</sup> Statistical testing was not performed, cf. recommendations of Ledford, Wolery & Gast (2014).

collaborates to complete the turn (n=4). Both techniques can be regarded as implementing ‘least collaborative effort’ in conversation as discussed by Milroy and Perkins (1992), as these strategies allow conversation to proceed as smoothly as possible without emphasizing problems connected to Riitta’s aphasia. However, at this point it should be mentioned that all repair action was obviously not related to aphasic trouble but to more mundane problems, which can also be encountered in non-aphasic conversations.

In the following, we will take a closer look at these two most frequent repair actions. First, we will explore how this dyad handled word searches, which are typical to all aphasic conversations (e.g. Laakso, 2015). Probably due to Riitta’s moderately mild expressive aphasia (as defined by language tests), our data did not include long ‘hint and guess’ sequences (Laakso & Klippi, 1999) or otherwise extended collaborative repair sequences. Instead, this dyad collaborated quite efficiently to resolve Riitta’s word searches, either by 1) Tiina providing a completion of the trouble source turn, or 2) Tiina presenting a candidate understanding for the missing word.

Excerpt 1<sup>2</sup> presents an instance where Tiina provides Riitta with a word, which completes a trouble source turn. In the preceding conversation they have talked about going to the gym and Tiina has asked her mother why she has not taken an interest in this kind of hobby.

Excerpt 1.

gazes at T.....

01 R:       mm. kun? tota:, .hh öhh <saattaa> olla että minä  
               **mm. when? we:ll .hh öhh <it might> be that I**

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<sup>2</sup> In addition to the traditional Jeffersonian transcript system (Jefferson, 2004), Riitta’s gaze was transcribed above the line: the gaze starts or shifts where the writing begins and the dotted line describes continuation of the action. Phonemic or phonological errors are italicized.

- .....gazes away from T.....
- 02 menen sitten kun minä [olen saanut tota, mth  
**will go when I [have got well, mth**  
 [ ((waving gestures away from body))  
 .....gazes at T.....
- 03 afasian kuntoutuksen, mhh hh (.) [pois. jo-  
**the aphasia rehab, mhh hh (.) [away. y-**
- 04 T: [loppuun.  
**[to an end.**
- 05 R: [joo.  
**[yeah.**
- 06 T: [nii.  
**[yeah.**
- 07 R: mm?

In lines 1-3 Riitta expresses her view on the topic and states that she might take up the issue when the aphasia therapy (related to this study) has ceased. There are several hesitation markers at the beginning of her turn (we:ll .hh öhh ), but Riitta produces several informative phrases (<it might> be that I will go when I have got) before there are signs of a word search. First, she gazes away from Tiina (line 2), which indicates she will try to resolve the problem herself (Goodwin & Goodwin, 1986). Then, the turn continues multimodally as Riitta produces olen saanut (have got) and simultaneously starts a gesture where she initially waves both hands away from her body, palms facing forward, and thereafter repeats the gesture several times with her right hand. Upon continuing her turn, however, Riitta encounters a word-finding problem indicated by the hesitation particle (well, line 2). Hesitations and search particles are typical indications of word search (e.g. Laakso & Lehtola, 2003). She manages to resolve the current word search by uttering the words aphasia therapy (line 3), at

which point she shifts her gaze back to Tiina. At this point she encounters a second word finding/turn constructional problem, which is indicated by the hesitation and pause (mhh hh (..)). Also, the prosodic contour of Riitta's turn indicates that she has not finished. This time (line 4) Tiina gets involved as she provides the word loppuun (to an end) that fills the 'slot' and completes Riitta's turn. However, in overlap with Tiina's completion Riitta succeeds to produce the word pois (away). Lexico-semantically Tiina's choice of word is more acceptable than Riitta's away. Interestingly, Riitta's choice of word coheres with her gesture and it seems that it is the very gesture on line 2, that invited Tiina produce the word loppuun. What we see here is an interplay of speech production, gaze and gestures that as a consequence involves Tiina in collaborative turn construction. The overlapping turn completion seems to invite both to affirm that they have come to the right conclusion (lines 5 and 6). As this affirmation also overlaps, Riitta produces a short affirmation token (line 7), after which the conversation continues swiftly onto a related topic.

Excerpt 2 illustrates what can be considered an ultimate instance of word-finding/turn constructional problems; a lexically empty turn. Lexically empty turns have also been identified as trouble sources in aphasic conversation by Perkins et al. (1999). Although this source of trouble was rare in the data (n=2), we wanted to include this excerpt because on the one hand it demonstrates Riitta's problems related to aphasia, and on the other hand these kinds of sequences were interestingly only found in the first two conversations (i.e. preceding ILAT). We consider these sequences as borderline cases of repair and therefore it has to be pointed out that these types of sequences were not identified by the independent rater, as there was no apparent (linguistic) information to repair (i.e. these sequences are not taken into account in the collection of 35 repair sequences). While not explicitly being an OISR sequence, this sequence borders on being an SIOR similar to excerpt 1, where Riitta's



embodied action in this context invites Tiina to produce a turn resembling a candidate understanding. This excerpt comes in the conversation in which Riitta and Tiina have been talking about an exercise group for pensioners, which Riitta has previously participated in. In previous turns, Riitta has stated that she finds the instructor odd.

Excerpt 2.

- 01 T: millä lailla,  
**in what way,**  
gazes away from T .....
- 02 R: totah, ö:vöh tota, mmh mth (2.2) mhh öv:hh  
**wellh, ö:vöh well, mmh mth (2.2) mh öv:hh**  
.....gazes at T
- 03 (2.0) tota, mvhh e  
**(2.0) well, mvhh e**
- 04 T: -> puhuuko hän huonost  
**does he speak poorly**
- 05 R: e: e:i hän puhu, huonosti mutta, ö tota, mm öh  
**n: no: he doesn't speak poorly but, ö well, mm öh**
- 06 kaikesta pääte- kaik- k- k- kaikesta pääten  
**by all acc- al- a- a- all accounts**
- 07 hänellä oli aivovamma si- te:, (.) kertoi itse.  
**he had a brain damage the:n, (.) told himself.**
- 08 T: jaha.  
**okay.**

Excerpt 2 begins with Tiina asking in what way Riitta thinks the instructor is odd. A question projects an answer as an adjacency pair, and this is what Riitta tries to produce in her next turn (lines 2-3). She starts her turn with hesitation tokens (wellh, ö:vöh well,), and gazes

away from Tiina, which indicates she will try to resolve the problem herself (Goodwin and Goodwin, 1986). Long pauses and more hesitations follow, after which Riitta gazes at Tiina and at the same time produces the stressed vowel *e* (line 3), which can be regarded as a colloquial form of the Finnish word no (*ei*). The long struggle, the gaze shift to Tiina, and the stressed vowel-utterance display her giving up on trying to produce an answer and handing the conversational floor over to Tiina. Tiina responds to this by a turn resembling a candidate understanding formed as a question (does he speak poorly.) This again seems to facilitate Riitta, as she answers with a rejection recycling the words Tiina provided in her turn n: no: he doesn't speak poorly (line 5), followed by an explanation that the instructor has a brain damage and by adding that it was the instructor himself who told her this, which implicates that Riitta recognizes the delicate issue she is talking about.

As already touched upon, a candidate understanding is the most frequently used repair initiation technique used by Tiina. As candidate understandings are used to offer a possible solution to a problem, they project an affirmation or a rejection as a next turn (e.g. Kitzinger, 2013), though an affirmation is preferred as the conversationalists avoid to faulty a candidate understanding as this could hamper the flow of conversation, or it could be interpreted as criticism of the co-conversationalist's conversational competence (Kurahila 2006: 155). In our data the general structure of candidate understanding sequences is the following:

- 1) Riitta's trouble turn or problematic sequence
- 2) Tiina's candidate understanding
- 3) Riitta confirms the candidate understanding or rejects it, followed by an explanation
- 4) (Tiina's post-confirmation)

Candidate understandings have different functions in our data. With regard to

turn construction, most of them were uncertainty-marked candidate understandings (cf. Kurhila, 2006: 174-197), which Tiina produced in order to 1) resolve a word-finding problem, 2) elaborate on a previous troublesome turn, which typically entailed a referential problem, or 3) offer a conclusion of a preceding sequence. Excerpt 3 provides an example of the first case; Tiina using a candidate understanding in resolving Riitta's word-finding difficulty. Candidate understandings with this basis of trouble were rare in the data, occurring only in the first conversation. The excerpt begins when Tiina introduces the new topic of Christmas presents into the conversation.

Excerpt 3.

- 01 T: no mitä sä haluut joulupukilta  
**well what do you want from Father Christmas**
- 02 R: .hhh hö:hh kartan.  
**.hhh hö:hh a map.**
- 03 T: kartan.  
**a map.**  
 gazes down towards table.....
- 04 R: v:hh sellasen kartan tota: [m vhh .hh tota:  
**v:hh that kind of map we:ll [m vhh .hh we:ll**  
 [((moves finger on table top))  
 .....lifts gaze to T.....
- 05 Prismassa on .h niitä karttoja, sellainen s- ö  
**Prisma (name of store) has .h those maps, kind of s-ö**  
 .....gazes away...gaze to T.....
- 06 tota:m [mth sell[a:st  
**we:llm [mth that kind of**  
 [((gestures an opening book))
- 07 T: -> [autokartta vai  
**[y'mean a road map**

- gazes away from T.....gazes at T
- 08 R: ei kun s- sellaisen kartan mikä kertoo  
**no but that kind of map which tells you about**
- 09 maailmasta.  
**the world.**
- 10 T: =aha?  
**=I see?**

After Tiina's inquiry about what Riitta wants for Christmas (line 1), Riitta replies that she would like to have a map (line 2). Tiina repeats the word map, which is produced with a falling intonation and thus acts more as a confirmation or topicalization than as a request for clarification (line 3). In her next turn, Riitta (lines 04-06) specifies the kind of map she has in mind. However, the turn production requires a great deal of effort. Riitta first produces an adjective sellasen (that kind of), which in this context does not offer any specification, and repeats the word map. In addition, this utterance is accompanied by multimodal actions; Riitta shifts her gaze towards the table and moves her finger against the table top. Riitta continues to struggle with her word search and manages to produce two search particles (we:ll, line 4). What follows is Riitta leaving the syntactic unit (that kind of map well m vhh .hh well) incomplete by producing a new unit. This unit adds the description that those maps can be found in Prisma stores (line 5). This type of fragmented syntactic construction as well as constructions acting as 'place holders' for the missing word, more specifically a noun, have been identified as indicative of word search in Finnish-speaking PWAs (Helasvuo, Laakso & Sorjonen, 2004).

To this point Riitta gazed down towards the table. However, after being able to produce the new information about where the maps can be found, she shifts her gaze to Tiina, and continues her attempt to specify the target further (kind of, end of line 5). But once more

Riitta encounters word-finding problems indicated by the word search particle we:llm (line 6). She gazes away, indicating self-directed word search, but almost instantly a change occurs as she shifts her gaze to Tiina, and with this action invites Tiina to take part in the word search (Goodwin and Goodwin, 1986). Nevertheless, Riitta's own efforts continue. She produces yet another imprecise adjective (that kind of, line 6), but of special interest is that the turn is constructed of multimodal actions: prior to producing the imprecise word, she makes a pantomimic hand gesture, which depicts the opening of a book. Incorporating gestures during a word search is a typical action when a target word is not available (e.g. Klippi & Ahopalo, 2008). This pantomimic gesture facilitates the conversation, as Tiina very quickly responds with a candidate understanding y'mean a road map (line 7). The Finnish vai particle at the end of the turn indicates uncertainty and thus marks the turn as a candidate for the missing word (noun). As a candidate turn, it requires an acceptance or denial in the next turn, and as it turns out Riitta rejects (no but, line 8) the word Tiina provides. Nevertheless, Riitta succeeds in elaborating the word map with a subordinate clause (which tells about the world) (lines 8-9). Tiina receives this as new information indicated by the news token (I see?) (line 10).

Excerpt 4 presents a sequence with two candidate understandings, which are not as explicitly related to word-finding problems as the previous examples. The first candidate understanding is formed as a paraphrase and functions as checking the understanding of the preceding turns, and the second seeks elaboration on the previous turn with referential problems. Excerpt 4 is only a part of an extended sequence. In this sequence Riitta and Tiina are talking about the treatment related to this study.

Excerpt 4.

- 01 R: °se ei° se ei ole puheterapaa .hh vaan  
 °it's not° it's not **speech-language therapy** .hh but  
 02 .hh eh sillä tavalla korteill leikitään.  
 .hh eh **you kind of play with cards.**
- 03 T: -> aha? [siis ryhmässä.  
 uhuh? **[y'mean in a group.**
- 04 R: [m.  
 [m.
- 05 R: joo kyllä. kyllä .hh siinä on tota:m .hhh  
**yeah yes. yes. .hh there are we:llm .hhh**
- 06 öhmhm .hh kaksi naista ja yksi mies. ja,  
 öhmhm .hh **two women and one man. and,**
- 07 [pu-  
 [pu-
- 08 T: -> [siinä ryhmässä  
**[in the group**
- 09 R: =joo. ja puheterapeutta on .hh ömhh (1.0) mies.  
**=yes. and the SLT is .hh ömhh (1.0) a man.**
- 10 T: joo.  
**yes.**

As excerpt 4 begins, Riitta is correcting Tiina's previous presumption that Riitta will receive speech and language therapy by stating that °it's not° it's not speech-language therapy, and providing more accurate information by explaining that it is going to be a card game instead (lines 1-2). However, Riitta constructs her turn in a passive voice and she also omits any reference to place. Tiina first receives this information as news as indicated by the news receipt token (uhuh?) with rising intonation (line 3). Her continuation is of particular interest here: she produces a candidate understanding y'mean in a group. The Finnish particle siis

acts as a marker of an explanation, which specifies something proposed earlier (ISK: § 807).

In this context, in order to grasp what the card playing is related to, Tiina shifts her orientation to something Riitta has mentioned a few turns earlier in the conversation: the treatment occurs in a group. Thus, Tiina's turn provides a display of recognition and reverbilizes a detail of prior talk (place reference), which marks it as a paraphrasing candidate understanding (Kurhila, 2006: 161).

The continuation of excerpt 4 illustrates how Riitta's lack of reference raises the issue of group treatment again. After a strong confirmation (yeah yes. yes.) to Tiina's candidate understanding (line 5), Riitta continues to tell Tiina about the group, but omits any reference to place. Instead, she produces an unspecified locative construction there is, followed by information about the group members. Tiina treats the imprecise place reference as troublesome (line 8), and initiates repair. The second candidate understanding interrupts Riitta with a partial repetition of Riitta's locative construction (there) and the missing noun referring to the place (in the group). The prominent first-syllable stress on group marks it as an interrogative, and thus as an uncertainty-marked candidate understanding elaborating an utterance (Kurhila, 2006: 175). Riitta immediately confirms this candidate understanding in her next turn and continues her interrupted turn (line 9). Tiina's post-confirmation on line 10 indicates that the problem has been solved.

To summarize so far, excerpts 1-4, which are all extracted from conversations preceding ILAT, present instances of collaborative repair work in cases of word search (excerpt 1-3) as well as candidate understandings orienting backwards in the conversation, targeting a restricted trouble source (excerpt 4). Now, we will turn to the last two conversations, which were recorded after ILAT. In addition to a lower frequency of candidate understandings in these conversations, we found that candidate understandings functioned as

conclusions or as completions of longer sequences of talk, and this was typical for the last two conversations. We found only one instance, where a candidate understanding was used to target a specific referential problem such as in excerpt 4. Furthermore, we found no candidate understandings responding to word searches or lexically empty turns.

Excerpt 5 presents a case where Tiina produces a candidate understanding, which functions as a conclusion. The excerpt is a part of a longer sequence initiated by Riitta. In preceding turns Riitta and Tiina have established mutual understanding about a particular piece of computer software concerning weight watching. Moreover, Riitta has indicated that she wants to reset the software. Here, the issue is still unresolved.

Excerpt 5.

- 01 T:     ni mik<sup>s</sup>. mitä #m# sä haluut pois  
           **so why. what #m# do you want away (to get rid of)**
- 02 R:     tota v- j- ja totas saako sen tota  
           **well v- j- and well can you get it well**
- 03         tietokoneesta pois kun minä aloittaisin  
           **off the computer as I would start**
- 04         uudelleen  
           **over**
- 05 T:     ha ha ai sä haluut     [pyyhk-  
           **ha ha oh you want to [(wipe)**
- 06 R:                                     [kyllä, joo.  
   **[yes, yeah.**
- 07 T: -> no mutta eihän se, siis sä haluut sen vanhan  
           **well but it isn't, so you want the old**
- 08         niinku,  
           **like**



- 09 R: kyllä. kyllä.  
**yes. yes.**
- 10 T: deletoituu  
**deleted**
- 11 R: =>ni ni.<  
**=>yeah yeah.<**
- 12 T: >kyl sen varmaan< jotenki saa,  
**>I suppose< somehow it can (be worked out),**

Excerpt 5 begins with Tiina asking for clarification about what Riitta wants to get rid of (line 1). Instead of producing a straight answer, Riitta reformulates her earlier question, asking if one can delete it because she would like to start over again (line 2). This turn is imprecise in terms of reference: the pronoun it leaves the target open. In contrast to excerpt 4, the imprecise reference does not in this case result in Tiina offering an elaborative candidate understanding. This may be due to the fact that Riitta provides new information explicating that she would start over (lines 3-4). To this, Tiina responds with laughter. In addition, Tiina produces an utterance displaying understanding: oh you want to (wipe) (line 5). However, Riitta interrupts her with repetitive confirmation tokens. As Tiina fails to complete her turn, she recycles it by changing its structure (lines 7-10). Towards the end of her turn, Tiina produces a conclusion of what she has gathered so far. She structures her turn as an uncertainty-marked candidate understanding so you want the old like, deleted. Similar to excerpt 4, Tiina marks the candidate understanding with the particle siis (Kurhila, 2006: 195). But instead of offering a targeted initiation of repair, Tiina summarizes prior information using a larger context (i.e. she produces a conclusion). The answer to Riitta's original question comes on line 12, so mutual understanding is reached after this side sequence.

The last excerpt, which is extracted from a conversation post-ILAT, presents the only instance of a completing candidate understanding in our data. Kurhila (2003; 2006) has found completing candidate understandings to be responsive to troublesome turns in linguistically asymmetric dyads (native speaker – non-native speaker). According to Kurhila (2003: 295-296), the linguistic problems surface in everyday conversation and particularly in longer stretches of talk, such as in narratives. In that context, a completing candidate understanding can function as a remedy to the linguistic problems and can help the conversation to move forward without exposing the speaker with linguistic problems as incompetent. In contrast to uncertainty-marked candidate understandings (extracts 4-5), completing candidate understandings demonstrate the speaker's understanding of the implications of the prior turns and thus verbalizes an upshot of prior talk (Kurhila 2006: 214). Excerpt 6 is preceded by conversation about Riitta's washing machine making a strange noise as it spins. As the excerpt begins, Riitta is trying to explain how the machine works during the spinning.

Excerpt 6.

gazes at the table.....

01 R: no? tota, .hhh mhh seo [kun ö tota, *pyö- pyykyt*  
**um? well, .hhh mhh seo [when ö well, pyö- pyykyt**  
 [((draws circles on the table  
 .....  
 02 ovat sielä .hh [tossa,  
**is there .hh [in the,**  
 [((back and forth with finger on table))  
 03 T: =mm?  
**=mm?**  
 .....gazes up.....gazes away.....

- 04 R: =joo. ja nah- seh, .hh hhhmmööh öm: ö: kun se  
**yes. and nah- it, .hh hhhmmööh öm: ö: when it**  
 .....
- 05 alkaa <lingota> niin sen: eö se l- jättää  
**begins to <spin> then it's eö it l- quits**  
 .....gaze to T.....
- 06 linko:mesen kesken kun pyykit ovat sielä  
**the spinning when the laundry is there**  
 .....
- 07 rutussa ja sitten [pyörättelee pyykkiä ja  
**wrinkled and then [whirls the laundry and**  
 [((swirling hand gesture  
 .....
- 08 ei la- linkoaa uudestaan.  
**doesn't la- spins again.**
- 09 T:-> niin niin. [et se halua ne niinku tasaseks  
**yes. yes. [so it wants them like flat**
- 10 R: [joo joo (.) ky-  
**[yeah yeah (.) y-**
- 11 R: kyllä, kyllä, joo.  
**yes. yes, yeah.**

In lines 1-2, Riitta's aphasic problems are quite recognizable. She produces non-fluent speech such as hesitation tokens, and compensates for her inability to proceed fluently by using hand gestures (similar to excerpt 3). Nevertheless, she manages to produce the utterance when the laundry is there, which frames the forthcoming story. At this point, Tiina positions herself as a receiver. She displays interest and encourages Riitta to continue with her turn (mm?, line 3). Indeed, Riitta continues, but her speech production is non-fluent. Her utterance includes

hesitations (line 4) and she gazes away, indicating that she is holding on to her turn as she is engaged in word searching and does not want to be interrupted (Goodwin and Goodwin, 1986). Finally, Riitta manages to quite fluently produce several informative units of talk describing the actions of her washing machine. Tiina responds to Riitta's long turn by presenting a completing candidate understanding yes yes. it wants them like flat (line 9). The Finnish particle niin is described as a receipt dialogue particle, and when repeated (niin niin), the particle displays reception of a longer sequence (ISK: § 799). According to Kurhila (2006: 204) the initial particles ni(in) et(tä) can be described as prototypical in candidate understandings of the completing type. Riitta's emphatic affirmation to the candidate understanding comes in the next turn (line 11) with repetitive affirmation tokens.

## Discussion

In this study we explored the use of CA to compare collaborative repair action in everyday conversation between a PWA and her CP before and after impairment-focused aphasia therapy. To our knowledge, the effects of ILAT have thus far not been studied at the level of everyday conversation with significant others and as such, we consider this case study a starting point for future research on the topic.

The conversations in this study were asymmetric in the sense that it was the CP who initiated the majority of repair sequences, which is not surprising when we are dealing with aphasic conversation (see e.g. Wilkinson, 2015). The most frequent repair initiation technique used by the CP was a candidate understanding, which has been identified as a useful repair strategy both in aphasic conversations (e.g. Milroy & Perkins, 1992) and other occasions where a conversationalist has limited linguistic resources (e.g. Kurhila, 2006; Lilja,

2010) as it does not put the linguistic problem in the spotlight but serves to resolve the problem with ‘least collaborative effort’ (see Milroy & Perkins, 1992: 31). Of particular interest is that the function of candidate understandings shifted from elaborating specific trouble sources, such as imprecise reference, in the conversations preceding ILAT, to concluding or completing longer stretches of PWA’s talk in the two latter conversations. Candidate understandings in the context of trouble sources explicit to word-finding problems or lexically empty turns were rare in the data overall (probably reflecting Riitta’s mild aphasia), but non-existent after ILAT. Thus, in accordance with Perkins’ et al. (1999) assumption, our analysis of everyday conversation data revealed qualitative changes in collaborative repair sequences, suggesting a change in the nature of trouble sources. Concurrently, we observed a clinically significant (cf. Katz & Wertz, 1997) increase in the WAB AQ following ILAT, supporting a treatment-related change in Riitta’s linguistic skills.

The amount of candidate understandings also diminished in general following ILAT. This is of interest since Kurhila (2006: 155), referring to Heritage’s (1985) and Drew’s (1998) work, has stated that candidate understandings are rare in ordinary everyday conversation, whereas they are often found in linguistically asymmetric or institutional interaction. Therefore, demonstrating a decrease in the use of candidate understandings (in the environments of repair action typical to aphasia) in everyday conversation by the CP following impairment-focused aphasia therapy could provide evidence for claiming that asymmetry due to aphasia has diminished and thus that treatment has made a difference in daily life. With the data from this study, this conclusion would be premature, thus leaving it to future studies with larger data to be examined. Also, more specific data on the frequency of candidate understandings in ordinary (Finnish) everyday conversation is needed.

The rationale for assuming that treatment effects of ILAT could be reflected in everyday conversation lies in the neuroscientific discovery of functional links between sensorimotor and language areas of the brain, which are established during interactional language learning and which can, for example in the case of a stroke, be reinforced by massed practice (Berthier and Pulvermüller, 2011; Difrancesco et al., 2012). In other words, intensive aphasia therapy implemented in a context, that combines language use with relevant group (inter)action is considered to re-strengthen the brain's interwoven neuronal language-action networks (Difrancesco et al., 2012). Boyle (2011: 1322) discusses the outcome of discourse treatment for word retrieval impairments in a review article, and reports that studies 'suggest that the discourse treatments were improving the process of word retrieval rather than improving the ability to name specific items'. Hence, if the PWA's use of language changes, it seems logical to assume that this will also be displayed in conversational interaction patterns.

When evaluating outcomes in everyday conversation, an important question is the stability of conversation data. A shortcoming of our study is that we do not have multiple baseline conversation samples (cf. Carragher et al., 2012). Nevertheless, interaction strategies in dyads with a PWA with chronic aphasia have shown to be consistent from one occasion to another (Perkins et al., 1999). Similarly, conversation behaviours of the PWA have been found to be stable in the absence of treatment (Damico et al., 2015). But, as Perkins et al. (1999) point out, a multiple baseline pre-therapy would provide a measure of within-participant (or dyad) variation.

Finally, from a CA-informed aphasiology perspective, conversations of the dyad presented in this paper appeared to be successful by nature. Had these conversation samples contained barrier behaviours (e.g. the use of test questions), we would, in the light of current

knowledge of conversation therapy (e.g. Beeke et al., 2015; Simmons-Mackie et al., 2014), recommend treatment that targeted it. In our opinion, conversation therapy tailored to the individual needs of dyads and targeted at reducing barrier behaviours and enhancing facilitative strategies has not yet obtained the importance it should have in clinical practice.

### **Clinical implications**

A core duty for SLTs working with PWAs is to demonstrate the efficacy of the therapy provided. Our paper suggests that instead of mere frequency count of conversational behaviours, a qualitative analysis of everyday aphasic conversation encompassing the context and function of conversational phenomena can provide an ecologically valid account that impairment-focused aphasia therapy has made a difference in the life of a PWA.

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## References

- Basso, A. (2010). "Natural" conversation: A treatment for severe aphasia. *Aphasiology*, 24, 466-479.
- Beeke, S., Beckley, F., Johnson, F., Heilemann, C., Edwards, S., Maxim, J., & Best, W. (2015). Conversation focused aphasia therapy: Investigating the adoption of strategies by people with agrammatism. *Aphasiology*, 29(3), 355-377.
- Berthier, M. L., & Pulvermüller, F. (2011). Neuroscience insights improve neurorehabilitation of poststroke aphasia. *Nat Rev Neurol*, 7(2), 86-97.
- Best, W., Grassly, J., Greenwood, A., Herbert, R., Hickin, J., & Howard, D. (2011). A controlled study of changes in conversation following aphasia therapy for anomia. *Disability and Rehabilitation*, 33, 229-242.
- Boo, M., & Rose, M. L. (2011). The efficacy of repetition, semantic, and gesture treatments for verb retrieval and use in Broca's aphasia. *Aphasiology*, 25(2), 154-175.
- Boyle, M. (2011). Discourse treatment for word retrieval impairment in aphasia: The story so far. *Aphasiology*, 25(11), 1308-1326.
- Carragher, M., Conroy, P., Sage, K., & Wilkinson, R. (2012). Can impairment-focused therapy change the everyday conversations of people with aphasia? A review of the literature and future directions. *Aphasiology*, 26(7), 895-916.
- Carragher, M., Sage, K., & Conroy, P. (2013). The effects of verb retrieval therapy for people with non-fluent aphasia: Evidence from assessment tasks and conversation. *Neuropsychological Rehabilitation*, 23(6), 846-887.



- Carragher, M., Sage, K., & Conroy, P. (2015). Outcomes of treatment targeting syntax production in people with Broca's-type aphasia: Evidence from psycholinguistic assessment tasks and everyday conversation. *International Journal of Language & Communication Disorders*, 50(3), 322-336.
- Damico, J., Tetnowski, J., Lynch, K., Hartwell, J., Weill, C., Heels, J., & Simmons-Mackie, N. (2015). Facilitating authentic conversation: An intervention employing principles of constructivism and conversation analysis. *Aphasiology*, 29(3), 400-421.
- De Renzi, E., & Faglioni, P. (1978). Normative data and screening power of a shortened version of the Token test. *Cortex*, 14, 41-49.
- Difrancesco, S., Pulvermüller, F., & Mohr, B. (2012). Intensive language-action therapy (ILAT): The methods. *Aphasiology*, 26(11), 1317-1351.
- Drew, P. (1998). An exercise in the comparative analysis of talk-in-interaction in different (institutional) settings: The case of 'formulations'. In H. Lehti-Eklund (Ed.), *Samtalsstudier* [Studies in conversation]. Meddelanden från Institutionen för nordiska språk vid HU B:19 ( pp. 29-42). Helsingfors: Universitetsstrycket.
- Ferguson, A. (1994). The influence on aphasia, familiarity and activity on conversational repair. *Aphasiology*, 8(2), 143-157.
- Goodwin, M. H., & Goodwin, C. (1986). Gesture and coparticipation in the activity of searching for a word. *Semiotica*, 62, 51-75.
- Helasvuo, M., Laakso, M., & Sorjonen, M. (2004). Searching for words: Syntactic and sequential construction of word search in conversations of Finnish speakers with aphasia. *Research on Language and Social Interaction*, 37(1), 1-37.

- Herbert, R., Best, W., Hickin, J., & Howard, D. (2012). *POWERS Profile of word errors and retrieval in speech*. Guildford, Surrey, UK: J&R Press.
- Herbert, R., Best, W., Hickin, J., Howard, D., & Osborne, F. (2003). Combining lexical and interactional approaches to therapy for word finding deficits in aphasia. *Aphasiology*, 17(12), 1163-1186.
- Herbert, R., Gregory, E., & Best, W. (2014). Syntactic versus lexical therapy for anomia in acquired aphasia: Differential effects on narrative and conversation. *International Journal of Language & Communication Disorders*, 49(2), 162-173.
- Herbert, R., Hickin, J., Howard, D., Osborne, F., & Best, W. (2008). Do picture-naming tests provide a valid assessment of lexical retrieval in conversation in aphasia? *Aphasiology*, 22(2), 184-203.
- Heritage, J. (1985). Analyzing news interviews: Aspects of the production of talk for an overhearing audience. In T. A. van Dijk (Ed.), *Handbook of discourse analysis*. Vol 3. (pp. 95-117). London: Academic Press.
- Holland, A. L. (1991). Pragmatic aspects of intervention in aphasia. *Journal of Neurolinguistics*, 6, 197-211.
- ISK = *Iso suomen kielioppi [Finnish grammar]* (2004). Hakulinen A., Vilkuna M., Korhonen R., Koivisto V., Heinonen T. and Alho I. (Eds.), Helsinki: SKS.
- Jefferson, G. (2004). Glossary of transcript symbols with an introduction. In G. H. Lerner (Ed.), *Conversation analysis. Studies from the first generation* (pp. 13-31). Philadelphia: John Benjamins.
- Katz, R. C., & Wertz, R. T. (1997). The efficacy of computer-provided reading treatment of chronic aphasic adults. *Journal of Speech, Language & Hearing Research*, 40(3), 493.

- Kitzinger, C. (2013). Repair. In J. Sidnell, & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 229-256). Chichester: Wiley-Blackwell.
- Klippi, A. (1996). *Conversation as an achievement in aphasics*. Studia Fennica Linguistica 6. Helsinki: SKS.
- Klippi, A., & Ahopalo, L. (2008). The interplay between verbal and nonverbal behaviors in aphasic word search in conversation. In A. Klippi, & K. Launonen (Eds.), *Research in logopedics. Speech and language therapy in Finland. (M. Müller and M.J. Ball, serial eds. Communication disorders across languages.)* (pp. 146-174). Clevedon: Multilingual Matters.
- Klippi, A. (2015). Pointing as an embodied practice in aphasic interaction. *Aphasiology*, 29(3), 337-354.
- Koshik, I. (2005). Alternative questions used in conversational repair. *Discourse Studies*, 7(2), 193-211.
- Kristensson, J., Behrns, I., & Saldert, C. (2015). Effects on communication from intensive treatment with semantic feature analysis in aphasia. *Aphasiology*, 29(4), 466-487.
- Kurhila, S. (2003). *Co-constructing understanding in second language conversation*. Doctoral dissertation. Department of Finnish language, University of Helsinki.
- Kurhila, S. (2006). *Second language interaction*. Philadelphia: John Benjamins.
- Laakso, M. (1997). *Self-initiated repair by fluent aphasic speakers in conversation*. Studia Fennica Linguistic 8. Helsinki: SKS.
- Laakso, M., & Lehtola, M. (2003). Sanojen hakeminen afaattisen henkilön ja hänen läheisen keskustelussa. *Puhe ja kieli*, 23, 1-24.

- Laakso, M. (2015). Collaborative participation in aphasic word searching: Comparison between significant others and speech and language therapists. *Aphasiology*, 29(3), 269-290.
- Laakso, M., & Klippi, A. (1999). A closer look at the 'hint and guess' sequences in aphasic conversation. *Aphasiology*, 13(4), 345-363.
- Laine, M., Koivuselkä-Sallinen, P., Hänninen, R., & Niemi, J. (1997). *Bostonin nimentätesti [The Finnish version of the Boston naming test]*. Helsinki: Psykologien kustannus.
- Laine, M., & Neitola, T. (2005). *Action naming test - ANT [Unpublished Finnish version]*.
- Ledford, J. R., Wolery, M., & Gast, D. L. (2014). Controversial and critical issues in single case research. In D. L. Gast, & J. R. Ledford (Eds.), *Single case research methodology* (2 nd ed., pp. 378-378-396). New York: Routledge.
- Lerner, G. H. (1996). On the "semi-permeable" character of grammatical units in conversation: Conditional entry into the turn space of another speaker. In E. Ochs, E. A. Schegloff & S. Thompson (Eds.), *Interaction and grammar* (pp. 238-276). Cambridge: Cambridge University Press.
- Lilja, N. (2010). *Ongelmista oppimiseen. Toisen aloittamat korjausjaksot kakkoskielisessä keskustelussa*. Doctoral dissertation. Jyväskylä studies in humanities 146. Jyväskylä: The university of Jyväskylä.
- Lindsay, J., & Wilkinson, R. (1999). Repair sequences in aphasic talk: A comparison of aphasic-speech and language therapist and aphasic-spouse conversations. *Aphasiology*, 13, 305-325.

- Meinzer, M., Rodriguez, A. D., & Gonzalez Rothi, L. J. (2012). First decade of research on constrained-induced treatment approaches for aphasia rehabilitation. *Archives of Physical Medicine and Rehabilitation*, 93(1), S35-S45.
- Milroy, L., & Perkins, L. (1992). Repair strategies in aphasic discourse; towards a collaborative model. *Clinical Linguistics & Phonetics*, 6(1&2), 27-40.
- Perkins, L., Crisp, J., & Walshaw, D. (1999). Exploring conversation analysis as an assessment tool for aphasia: The issue of reliability. *Aphasiology*, 13(4), 259-281.
- Pietilä, M., Lehtihalmes, M., Klippi, A., & Lempinen, M. (2005). *Western aphasia battery [Finnish version]*. Helsinki: Psykologien kustannus.
- Pulvermüller, F., Neininger, B., Elbert, T., Mohr, B., Rockstroh, B., Koebbel, P., & Taub, E. (2001). Constraint-induced therapy of chronic aphasia after stroke. *Stroke*, 32(7), 1621-1626.
- Pulvermüller, F., & Berthier, M. L. (2008). Aphasia therapy on a neuroscience basis. *Aphasiology*, 22(6), 563-599.
- Rose, M., Douglas, J., & Matyas, T. (2002). The comparative effectiveness of gesture and verbal treatments for a specific phonologic naming impairment. *Aphasiology*, 16(10), 1001-1030.
- Schegloff, E. A. (1993). Reflection on quantification in the study of conversation. *Research on Language and Social Interaction*, 26(1), 99-128.
- Schegloff, E. A., Jefferson, G., & Sacks, H. (1977). The preference for self-correction in the organization of repair in conversation. *Language*, 53(2), 361-382.
- Schegloff, E. A. (2000). When 'others' initiate repair. *Applied Linguistics*, 21(2), 205-243.

Sidnell, J., & Stivers, T. (Eds.). (2013). *The handbook of conversation analysis*. Chichester: Wiley-Blackwell.

Simmons-Mackie, N., Raymer, A., Armstrong, E., Holland, A., & Cherney, L. R. (2010). Communication partner training in aphasia: A systematic review. *Archives of Physical Medicine and Rehabilitation*, 91, 1814-1837.

Simmons-Mackie, N., Savage, M. S., & Worrall, L. (2014). Conversation therapy for aphasia: A qualitative review of the literature. *International Journal of Language & Communication Disorders*, 49, 511-526.

ten Have, P. (2007). *Doing conversation analysis* (Second Edition ed.). London: SAGE Publications.

Wilkinson, R. (1999). Introduction. *Aphasiology*, 13(4), 251-258.

Wilkinson, R. (2015). Conversation and aphasia: Advances in analysis and intervention. *Aphasiology*, 29(3), 257-268.

Table 1. Results of language tests. WAB AQ= Western Aphasia Battery Aphasia Quotient, BNT= Boston Naming Test, ANT = Action Naming Test.

	Baseline	Post sham- TMS	Post-ILAT	Follow-up	MAX
WAB AQ	87.8	87.3	93.6	92.6	100
BNT	52	55	55	54	60
ANT	53	54	52	57	60
Token	26	27	27	27	36

Table 2. Types of collaborative repair initiations across four data points by amount (n) and percentage (%) of occurrence per major turn.  
TS= trouble source.

Length of sample	Baseline 20 min 14 s		Post sham TMS 22 min 37 s		Post ILAT 18 min 3 s		Follow-up 20 min 23 s	
	PWA	CP	PWA	CP	PWA	CP	PWA	CP
Number of major turns	104	126	108	143	95	115	92	131
	n %	n %	n %	n %	n %	n %	n %	n %
<b>OISR</b>								
Candidate understanding		9 8.7		3 2.8		5 5.3		1 1.1
Partial repeat of TS-turn	1 0.8	3 2.9			1 0.9			
Targeted question		1 1.0						
Alternative question		1 1.0						
Question word + partial repeat of TS-turn				1 1.0		1 1.1		1 1.1
Open repair initiation (e.g. <i>Huh?</i> )								1 1.1
What is X? question					1 0.9			
Undefined								1 1.1
<b>SIOR</b>								
Completion of TS turn		3 2.9				1 1.1		
SUM	1 0.8	17 16.5	0 0.0	4 3.8	2 1.8	7 7.5	0 0.0	4 4.4
Mean of CP initiated repair pre- and post-ILAT, %	10.2				6.0			



	Week 1	Weeks 2 - 3	Week 4	Weeks 5 – 6	Week 7	3-month follow-up
GROUP A	Baseline Test 1	rTMS-treatment	Test 2	rTMS-treatment + ILAT	Test 3	Test 4
GROUP B	Baseline Test 1	sham rTMS-treatment	Test 2	sham rTMS-treatment + ILAT	Test 3	Test 4

Figure 1. Study design.

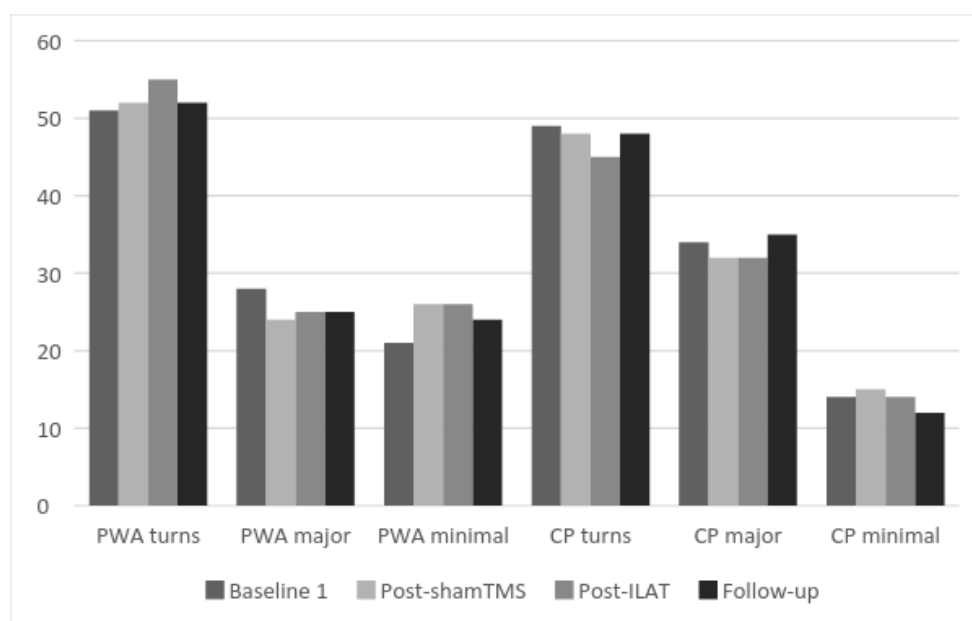


Figure 2. Percentages (%) of PWA's and CP's conversational turns, major turns and minimal turns in conversation across the four conversations.